ENTOMOLOGICAL
SOCIETY OF
BRITISH COLUMBIA

# PROCEEDINGS

OF THE

# ENTOMOLOGICAL SOCIETY

OF

# BRITISH COLUMBIA

JANUARY, 1915

NUMBER 5, N. S.

VANCOUVER, B. C.:
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# BRITISH COLUMBIA ENTOMOLOGICAL SOCIETY

## PROCEEDINGS, 1915

The Second midsummer semi-annual meeting of the British Columbia Entomological Society was held in the Board of Trade Hall, Kelowna, B. C., on Thursday, August 20th, 1914. Between forty-five and fifty individuals were present, from the Lower Mainland, Salmon Arm, Kootenay, Vancouver Island, and Okanagan districts. The 1st Vice-President, Mr. Lionel E. Taylor, F.Z.S., M.B.O.U., was in the Chair, and the members were called to order at 10 a.m. on August 20th, 1914.

The meeting was divided into morning, afternoon and evening sessions, and many useful papers were read. The papers presented will appear in the Proceedings of the Society at later dates.

The Fourteenth Annual meeting of the Entomological Society of British Columbia was held on January 16th, in the Auditorium of the Aberdeen School, Vancouver, B. C. The President, Mr. G. O. Day, F.E.S., was in the Chair and the members were called to order at 10 a.m. on the morning of January 16th. The meeting was divided into morning, afternoon and evening sessions, and eleven papers of systematic interest were read and several of economic importance. A lantern slide lecture on the Oestridae was given to the members in the evening by Dr. Seymour Hadwen, of the Experimental Farm, Agassiz. The papers presented will appear in this bulletin and other later bulletins of the Society.

### SECRETARY-TREASURER'S REPORT.

Correspondence.

The number of letters received and answered by the Secretary has exceeded all records of past years. It is gratifying to regard the progress the Society is making in creating an ever-increasing sphere of interest, both in this Province and elsewhere. Bulletin No. 4 has just

been issued and distributed, 1500 copies being printed. The special summer meeting was regularly held last August in Kelowna. The success is entirely due to Mr. H. H. Creese, Field Inspector, Provincial Department of Fruit Pests. The proceedings of this Kelowna meeting and the papers presented before the annual meeting of January, 1915, are being incorporated and will appear in due course as Bulletins 5 and 6.

With the sanction of the Advisory Board I beg to add the following names to our complimentary mailing list. For the most part, these individuals and institutions have requested to have their names placed on our mailing list, and in return are forwarding articles of their own for the benefit of our members and for our Library:

Library of the British Columbia University.
Library Department of Education, Victoria, B. C.
Robert Matheson, Div. of Entomology, Cornell, Ithaca, N.Y.
Library McGill University, Montreal, P.Q.
Library University of Minnesota, St. Paul, Minn., U.S.A.
American Entomological Society, Logan Sq., Philadelphia, Pa.
Geo. Moznette, Div. of Entomology, Corvallis, Oregon.
E. O. Essig, Div. of Entomology, Berkeley University, Cal.
Agricultural Gazette, Publications Branch, Dept. Agr., Ottawa.
Library University of Illinois, Urbana, Illinois, U.S.A.
Edmund Jarvis, Div. of Entomology, Brisbane, Australia.
Laboratorio di zoologie general & agraria, Portici, Napoli, Italy.
L. W. Swett, 501 Washington Street, Boston, Mass.
Messrs. Barnes and McDonough, Decatur, Illinois.
Columbia University, Barnard College, New York.

Letters of congratulations on our recent publications have been received from several sources. The correspondence of the Society is kept in a special book retained for the purpose, and is open to the members for perusal at any time. A full report of the progress and standing of our Society was duly forwarded to be read at the annual meeting of the Ontario Entomological Society in November, 1914.

## STATEMENT OF THE FINANCES OF THE BRITISH COLUMBIA ENTOMOLOGICAL SOCIETY.

Year ending December 31st, 1914.

| | Credit. | Debtor. |
|---|---|---|
| Deficit carried forward | | $ 96.50 |
| Distribution of Bulletin No. 3, viz.: Express, folders, postage | | 16.00 |
| General postage in Spring, 1914 | | 2.50 |
| Total deficit | | $115.00 |

| | | |
|---|---|---|
| Provincial Government Grant, Vote No. 247, made available April, 1914 | $350.00 | |
| By cheque to R. C. Treherne for loan | | 115.00 |
| By cheque to H. H. Creese, finances of Kelowna meeting, August, 1914 | | 20.40 |
| To R. C. Treherne, by cheque, Nov. 30th, Distribution of Bulletin, No. 4, $10.00; slides made for lantern use, $15.00 | | 25.00 |
| To Evans and Hastings, Printers, Dec. 2nd, 500 subscription notices | | 4.00 |
| To Hawkins and Hayward, Electricians | | 2.30 |
| Balance in bank to date, Dec. 31st | | 183.30 |
| | $350.00 | $350.00 |

## A NOTE ON THE OCCURRENCE AND SIGNIFICANCE OF ANOPHELINAE IN B. C.

Seymour Hadwen, D. V. Sci., Agassiz, B. C.

For several years notes and observations have been made on the mosquitoes of this province, their classification and seasonal prevalence, the main object being to find methods for their control. This work has been confined mainly to the **Culicinae**; as far as we know the genus **Anopheles** is represented, on the lower mainland, by a single species, **A punctipennis,** say. The Anophelines are never as numerous as the **Culicinae** and are often hard to find. **A punctipennis** is never found in large numbers, and it is only in the early spring that these mosquitoes are to be seen outside; it is at this season that they can be found biting animals. During the summer it is extremely hard to find a specimen; in the autumn they reappear on the walls of houses and in cellars.

The species **A maculipennis,** which I am recording in this paper, probably has the same seasonal prevalence as **punctipennis**: though it has been looked for in the Similkameen and Nicola valleys, its presence has not been recorded during the summer. This year it was discovered for the first time at Keremeos, B. C. This portion of the province is peculiarly situated and the climate is very hot and dry.

**A, punctipennis** is not definitely known to transmit malaria, while **A maculipennis** is a well-known carrier of the disease, both in Europe and in America. Its presence, however, does not necessarily infer the existence of malaria. Sometimes the mosquitoes are not infected. Thus, in Eastern Canada, **A maculipennis** is still comparatively common, though malaria, according to reports, is now of rare occurrence. In England, in certain malarial districts, the disease has disappeared while the mos-

quitoes showed no corresponding decrease in numbers. In the investigations of Nuttall, Cobbett and Strangeways-Pigg, these well-known authorities found many mosquitoes but no cases of malaria, in districts where the disease had been previously very prevalent. Later Theobald discovered a genuine case, contracted in England.

In conversation with residents of Keremeos, we have heard of cases of malaria in that part of the country. However, it is unnecessary to do more than mention this fact, without further discussion, for the subject can be better dealt with by a medical man.

I give a short description, taken from Patton and Cragg, of **A punctipennis** and **A maculipennis,** so that the two species may be readily distinguished.

**Anopheles punctipennis, say.** Palpi with two indistinct greyish bands, and apices sometimes grey. Thorax chestnut brown. Abdomen brown with golden hairs. Legs brown, except coxae, knees and tips of tibiae, which are yellowish. Costa black, with two yellow spots, one at the apex and the other at the apical third. This species is the winter anopheline of the United States.

**Anopheles maculipennis Meigen.** Palpi brown, unbanded. Thorax and abdomen brown. Legs brown without any definite bands. Costa dark, with four dark spots, two apical and two median. It is widely distributed in Europe, and is a natural carrier of the parasites of malaria in Italy. (Specimens of **A maculipennis** were shown at the meeting).

## APHID NOTES FROM BRITISH COLUMBIA.

By H. F. Wilson,
Entomologist, Oregon Experiment Station.

During the month of July, 1913, the writer had the pleasure of attending the summer meeting of the British Columbia Entomological Society, at Vernon, B. C., and the following species of aphids were collected during the trip:

1. **Macrosiphum stanleyi** n. sp. on **Sambucus glauca** in Stanley Park, Vancouver.

**Macrosiphum stanleyi** n. sp. (plate 1, figures 13-15.)

A large, light, green species found feeding on the under side of the leaves of **Sambucus glauca** Nutt. This species is common in the vicinity of Vancouver, B. C., and Seattle, Wash. I have not collected it in Oregon. All forms are lightly covered with a white bloom, which is much more abundant on the pupae. All forms are quite active and move about over the leaf surface when disturbed.

**Apterous viviparous female**—General color light yellowish green, the only exceptions being the sixth segment, with spur and tarsi, which are dusky to black. Nectaries and cauda same color as the body, eyes dark red. Body long and slender, the antennae reaching beyond the tip of the cauda and with the spur longer than the third segment. Antennae slender with a strong and prominent antennal tubercle. In this form, as sometimes in the pupae, the third antennal segment bears from two to seven irregular sensoria situated near the base and lying along one side of the segment. Legs long and slender. The nectaries are long and tapering, usually with a slight swelling near the tip, which makes them appear strongly constricted just back of the tip. Cauda short and slightly ensiform.

Measurements—Length of body, 4mm.; width, 1.58 mm.; length of antennae by segments, I, 0.15 mm.; II, 0.09mm.; III, 1.74 mm.; IV, 0.93 mm.; V, 0.84 mm.; VI, 0.3 mm.; spur, 1.8 mm.; total length of segments, 5.288 mm.; length of nectaries, 1.5 mm.; cauda, side measurement, 0.5 mm.

**Pupa**—General color light green covered with a fine white waxy powder or bloom. This form is slightly shorter and slightly narrower than the apterous forms. Length of body, 3 mm.; width, 0.95 mm.

**Alate viviparous female**—First collected in Stanley Park, Vancouver, British Columbia, July 14, 1913. General color, greenish white, the six antennal segments with spur and tarsi are dusky to black; eyes dark red. Body long and slender and without distinct markings. Antennae and legs long and slender, antennae reaching beyond the end of the cauda. Antennal tubercles large and strongly angled at the upper inner edge. Third segment with 12 to 18 round sensoria, which vary greatly in size. Wings hyaline and of the usual type.

Measurements—Length of body, 3.5 mm.; width, 1.25 mm.; total wing expanse, 8 to 9 mm.; length of antennae by segments, I, 13 mm.; II, 0.09 mm.; III, 1.06 mm.; IV, 0.95 mm.; V, 0.9 mm.; VI, 0.3 mm.; spur, 2 mm.; length of nectaries, 1.3 mm.; cauda, 0.55 mm.

2. **Macrosiphum frigidae** Oestlund on **Artemesia** sp., Vernon, July 16.

3. **Macrosiphum rudbeckiae** Fitch on **Solidago** sp., Vernon, July 16.

4. **Macrosiphum urticae** Schrank on **Urtica dioca,** Vernon, July 16.

5. **Macrosiphum ludovicianae** Oestlund on **Artemesia ludoviciana,** Vernon, July 16.

6. **Macrosiphum rosae** Linn., on **Rosa** sp., Vancouver, July 12.

7. **Nectarosiphon rubicola** Oestlund on **Rubus** sp., Vancouver, July 12.

8. **Myzus cerasi** Fab., on wild cherry, Vancouver, July 12.

9. **Aphis cerasifoliae** Fitch., on choke cherry, Vernon, July 16.
10. **Aphis sorbi** Kalt., on apple, Agassiz, July 13.
11. **Ahpis avenae** Fab., on apple, Vernon, July 16.
12. **Aphis cardui** Linn., on **Carduus** sp., Vernon, July 16.
13. **Hyalopterus arundinis** Fab., on **Prunis** sp., Vernon, July 16.
14. **Melanoxantherium smithiae** Monell., on **Populus** sp., Vernon, July 16.
15. **Cladobius populeus** Kalt.? on **Populus (tremuloides?)** Vernon, July 16.
16. **Arctaphis populifolii** Essig, on **Populus** sp., Vernon, July 16.
17. **Chaitophorus aceris** Linn., on **Acer** sp., Agassiz, July 13.
18. **Chaitophorus negundinis** Thomas, on **Acer negundo,** Agassiz, July 13.
19. **Euceraphis betula** Fitch, on Eastern birch, July 13.
20. **Phyllaphis fagi** Linn., on **Fagus** sp. (imported), Agassiz, July 13.

## MYZAPHIS (APHIS) ABIETINA WALKER. Plate I. Figs. 1-12.

This insect is here reported for the first time from North America; and should it continue to cause serious damage, as during the present season, it will be necessary to develop some methods of control.

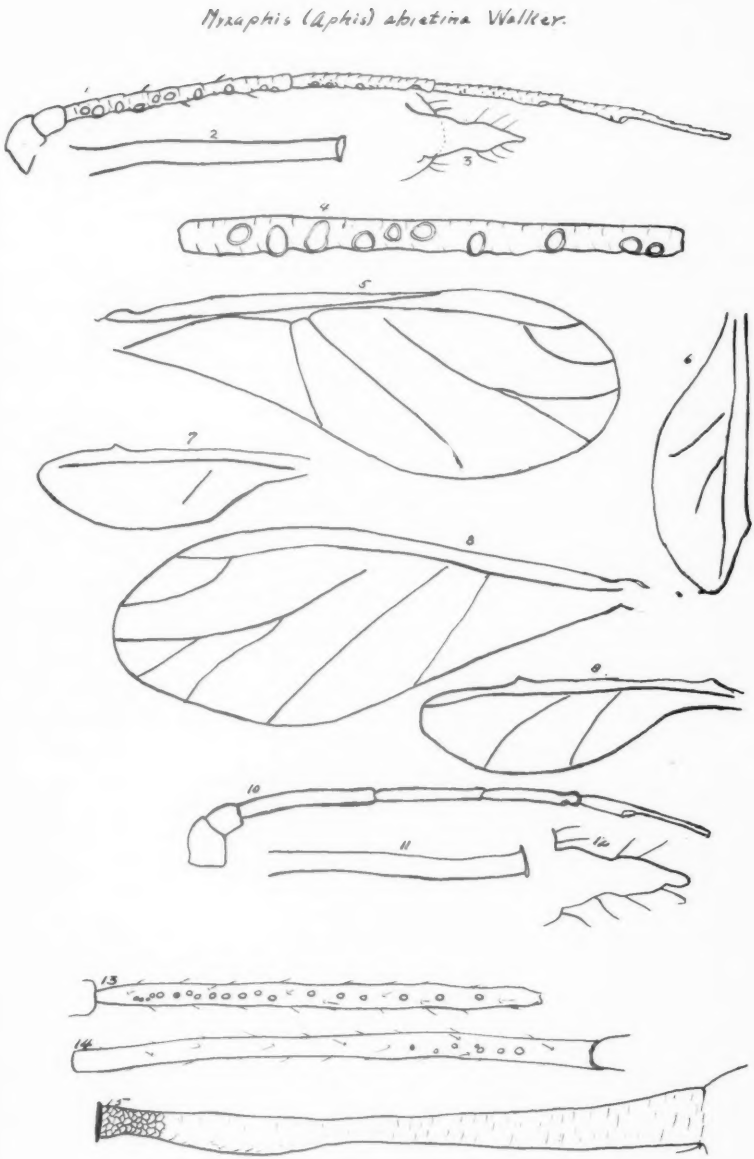
The material and notes used with this species were furnished me by Mr. R. C. Treherne and Mr. J. M. Swaine, of the Dominion Entomological Staff, and Dr. E. C. Van Dyke, of the University of California.

Mr. Treherne first noticed the aphids about May 1, 1914, on spruce trees in Stanley Park, Vancouver, B. C. By June 1 they had caused very serious damage, and all of the old needles were falling. Later observations by the parties mentioned show that practically every needle of last year's growth had fallen from the infested trees. The current year's growth was intact and uninfested. On some of the spruce twigs sent in to me, I found as high as seven aphids on a single needle, and nearly every needle was infested.

Mr. Treherne writes that "this insect is as serious, if not more serious, than any other insect attacking spruce in the forest lands along the British Columbia Coast at the present time."

Later in the season the aphids left the spruce and must have migrated to some alternate host, where they may be found feeding on either the roots or parts above ground.

This species was first described as new in 1848, and in England has received some little attention from various workers. The latest and




**Myzaphis (aphis) abietina** Walker.

Fig. 1, antennae; Fig. 2, nectary; Fig. 3, cauda; Fig. 4, third antennal segment much enlarged, of alate viviparous female; Figs. 5, 6, 7, wing venation from a single individual. Figs. 8, 9, normal venation; Fig. 10, antenna; Fig. 11, nectary; Fig. 12, cauda of apterous viviparous females.

**Macrosiphum stanleyi** n. sp.

Fig. 13, third antennal segment of alate viviparous female; Fig. 14, same of apterous female; Fig. 15, nectary of alate form.

most complete paper on this species, written by Professor F. V. Theobald, of Wye, Kent, England, will be found in "The Annals of Applied Biology," Vol. I., No. 1, May 1914. My determination of the species is based upon specimens sent to me by Professor Theobald. The known stages are described as follows:

**Apterous viviparous female:** General color, yellowish green to green, with a dark line on each side of the abdomen. Antennae pale yellowish green at the base and throughout segments three and four. The remaining parts dusky to black. Legs green, except tips of femora and tibiae, and tarsi. Nectaries pale green, tips dusky. Cauda, green. Head with a large broad frontal tubercle and with distinct antennal tubercles. Abdomen almost round, antennae about half as long as the body. Nectaries long and slender, and quite characteristic of the Genus Myzus. Cauda long, sharply tapering and constricted toward the base.

**Measurements:** Length of body, 1.55 mm.; width, 1 mm.; length of antennal segments, III, 0.44 mm.; IV, 0.176 mm.; V, 0.176 mm.; VI, 0.09; spur, 0.135 mm.; length of nectaries, 0.44 mm.; length of cauda, 0.22 mm.

**Alate viviparous female:** General color of head and thorax light brown, abdomen bright green with four rows of dark green spots; one row extends in a slow curve on each side of the median line, and the others extend along the sides of the abdomen. The two dorsal rows appear to be connected by faint dark green lines. Antennae yellowish green at the base and dusky green at the tip. Legs pale green, tips of tibiae and tarsi dusky. Nectaries pale green to dusky, cauda pale green. Antennae reaching to about the base of the nectaries. First antennal segment strongly gibbous, third roughened and with 9 to 12 or more sensoria, some of which are as wide as the segment itself, fourth segment with about four, fifth with one, and sixth with usual sensoria at base of spur. Wings with very variable venation, median vein sometimes once forked in front vein and occasionally wanting in hind wing. Opposite wings of same individuals may have widest possible variation. Nectaries cylindrical, sometimes with a very slight double curve, and reaching to tip of cauda. Cauda long and sharply tapering.

**Measurements:** Length of body, 1.6 to 1.8 mm.; width, 0.7 mm.; length of antennal segments, III, 0.42 mm.; IV, 0.242 mm.; V, 0.22 mm.; VI, 0.12 mm.; spur, 0.198 mm.; length of nectaries, 0.43 mm.; length of cauda, 0.25 mm.; length of wing, 2.8 mm.; width, 1 mm.

### References.

1. Ann. Mag. Nat. Hist., III, Ser. 2, pp. 301-302—1848.
2. P. Von der Goot, Zur systematik der aphiden, Tijdscrift voor Entomologie, Dec. LVI, 1913.

## NOTES ON THE EARLY STAGES OF CALOCAMPA CINERITIA, GROTE.

By G. O. Day, F.E.S., Duncan, B. C.

A female moth was found ovipositing on the twig of a sallow tree, soon after dusk on 11th March, 1914. A few catkins were out on the top of the tree, but the eggs were not laid on a blossom twig. The moth seemed to have started at end of twig with head turned inwards. She laid the eggs (75) in regular batches. I watched the operation for some time, and the following is the method of her procedure: After laying an egg against the one before, the moth moved a step forward and carefully felt about with her ovipositor for a position for the next egg. The eggs were deposited fairly regularly in rows of twos or threes.

Size of egg, 10/12 mm. (i.e., 12 eggs to 10 mm.). In shape rather flattened, broadest at base. Usual sculpturing with lines meeting in micropyle—micropyle not depressed. Color a faint greenish white at first, changing later to a light brown with pinkish tinge. The moth ceased to lay when boxed, but after about a week she began again and deposited a good number of eggs, mostly in sheets, that is, in flat masses with eggs laid regularly and side by side, but not adhering at their bases to the box. There were also a number of loose eggs which had evidently fallen away from the sheets. The sheets consisted of rows of threes and fours arranged similarly to the manner in which the eggs were laid on twigs.

Hatched out 5th April, 1914. Young larva rather active, 4 mm. in length; it rests on the two pairs of legs next the anal claspers, which are slightly raised, as is also the head and fore part of the body. Head yellowish, slightly wider than body. A yellow tinge on first segment merging posterially into reddish purple which becomes darker at tail end. As soon as the larva has eaten, the purple tinge goes and gives place to a uniform green, the same color as the sallow buds on which it feeds. Each segment has black dots on it, grouped in fours and twos, across, rather indistinct on the fore segments, more plain in the hinder. A short spiky hair is emitted from each of the dots, except those near the tail. After the first few days the color of the head becomes a light transparent brown. Expanse of larva 8 mm. at end of first stage.

On the 18th April, when the larvae were 9 mm. long, the black dots before noticed had all disappeared, the body fairly cylindrical, tapering slightly to each end. Color, bright green with a central dorsal white line, very distinct; and a similar white spiracular line, running the entire length of the body, from the head to the anal pair of legs. Midway between the dorsal and the spiracular lines there is a finer white line on

each side, making five lines altogether. Head yellowish green, somewhat transparent. Position at rest much the same as at first, i.e., clasping with the two pairs of legs next the anal claspers and with body raised. Fed on sallow leaves freely.

In the next instar the spiracular white lines are broader and more conspicuous than any of the others, otherwise the appearance of the larva is much the same. On 1st May, larva 19 mm. long; no change in general appearance except that white dots are apparent on each segment, two on each side of the central line, placed diagonally, and others, inconspicuous and variable, between the spiracular and subdorsal lines. The larva rolls up into a ring when disturbed, but the whole of the body is not on the same plane. On 10th May, when quiescent for moulting, the larvae were 27 mm. long, of a soft watery green color, and the only markings noticeable were the five longitudinal white lines, of which the most pronounced were the spiracular, then the mediodorsal, and finally the two intermediate lines the most indistinct. The regular white dots previously noted have now disappeared and the whole surface of the larva (except the belly) seems to be occupied by obscure whitish flecks only distinguishable under a hand lens. After casting the skin just described, the larva undergoes a complete change. The head becomes very broad, slightly broader than the body, and the color of the body is a soft, velvety light brown, with darker brown markings down the back with the exception of the first segment behind the head, which is plain like the head and divided from it by a dark brown line. The spiracular lines are very plain, being white tinged with brown. All the belly below the spiracular lines, a lighter brown than above. Length of larva 36 mm. immediately after moult. The darker dorsal markings are arrow-head shaped, the point of the arrow starting at the fold of each segment and extending obliquely forward across the segment and halfway into the next towards the head. These V-shaped markings start from and are connected by a central dorsal line of the same color.

By the 21st May most of the larvae had disappeared for pupation in soil placed in bottom of breeding jar. The full-fed larva is 40 mm. long and 7 mm. wide. Just before pupation the colors become more dull and the V-shaped marks not so conspicuous. It is a plump, healthy-looking larva of a russet-brown color, with a double dorsal line under which runs a vein which can be seen to pulsate, almost causing the line to disappear when contraction of the vein takes place.

## A DESCRIPTION OF THE EGG AND OVIPOSITOR OF CUTEREBRA FONTINELLA, CLARK. (Cottontail Bot.)

By Seymour Hadwen, D.V., Sci., Veterinary Research Laboratory, Agassiz, B. C.

In the study of the Oestridae, the most important problem at the present time is to discover the various methods of oviposition for the different species. From an economic point of view the most important question is: How do the larvae gain entrance to their respective hosts, after emerging from the egg? The following observations on the eggs and ovipositor of **Cuterebra fontinella** may be of some interest. Up to the present I have seen no descriptions of the eggs of any of the **Cuterebrae.**

The specimen from which the eggs were obtained was captured out of doors on July 30th, 1914, at Agassiz, B. C.

The measurements of the egg are: Length, 1.05 mm.; width, .03 mm. at the widest part. In shape it bears a resemblance to the egg of **Gastrophilus equi,** being somewhat canoe-shaped (Plate 1, Fig. 1). It possesses a deep groove on the under side, which is at least one-third longer in proportion than that of **G. equi.** In **G. equi** the groove is about half the length of the egg. (Plate 1, Fig. 2). On the upper side, at the end, is a well-marked operculum, very similar in shape and size to that of **G. equi,** though in the latter the operculum has reticulations differing from the markings on the rest of the egg. The egg case is rough and has a shagrenated appearance, the operculum not differing from the rest of the egg surface. (Plate 2, Fig. 3). The groove clearly indicates that the egg is meant to be attached to a hair, and that possibly the larva has, up to a certain point, a similar life history to that of **G. equi.** If so, for the emergence of the larva, moisture and friction must be supplied, such as would be furnished by the tongue of the host animal when licking itself.

The subsequent life history of Cuterebrine larvae must differ considerably from that of **G. equi;** because, in the various host animals, the larvae show a selective faculty for different parts of the body. For instance, **C. emasculator** selects the scrotum of **Tamias striatus lysteri** for its final habitat. Another undetermined species, specimens of which I have received, is reported to have been found in the backs of field mice. Two mature larvae, which were recently sent to me from Manitoba, were taken from the costal region of a domestic cat. Possibly in this case the cat was not the natural host, and the larvae acted in a similar manner to those of **Hypoderma bovis,** when they are found in an unusual host. According to Railliet they wander about and do not settle

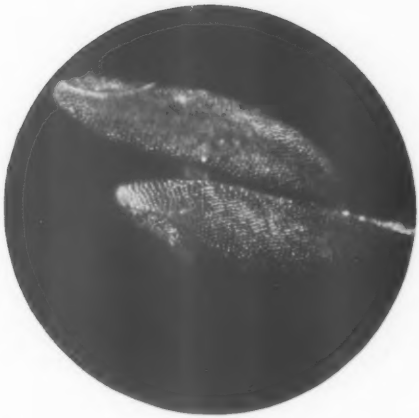


Fig. 1.

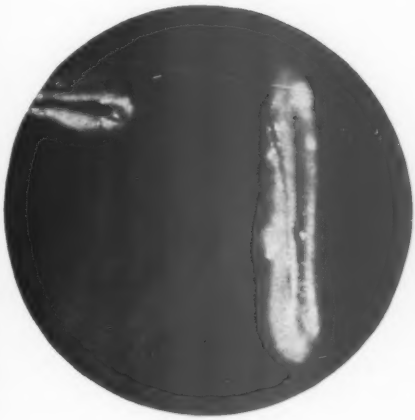


Fig. 2.

Fig. 3.

Fig. 4.

in any definite portion of the animal. In the case of the cat the larvae may have been swallowed when it was feeding on a squirrel. The only available reference of a similar kind is quoted by Washburn, where, he says: "Unidentified bots, possibly belonging to this genus **(Cuterebra),** have been taken from beneath the jaws of kittens."

According to Townsend the larvae of **C. fontinella,** which he found in rabbits, showed no selective faculty for any special part of the body. The positions he mentions are: The dorsal, pectoral and the ventral regions.

It may be well here to make a brief comparison between the eggs of the different Oestridae, of which I have descriptions.

**Hypoderma bovis** and **H. lineatum** have smooth eggs, attached to the hairs by a pedicel, and show no trace of operculum. The egg splits open to allow the emergence of the larva.

The egg of **Oedemagena tarandi,** the reindeer Warble-fly, has a modified operculum in the shape of a thin flap, along the edge of which the egg splits open. It is attached by a pedicel. According to Carpenter's figures, the egg of **O. tarandi,** apart from the opening flap, closely resembles that of **Hypoderma.**

The egg of **Gastrophilus equi** is somewhat curved, probably owing to the groove by which it is attached to the hair, which runs along the under side for about half its length. This groove must occupy space inside the egg, hence the corresponding bulge on the other side, to give room for the larva. It has a well-defined operculum, differently marked from the rest of the egg.

**Cuterebra fontinella**—This closely resembles the egg of **G. equi** in shape and in possessing an operculum and a similarly shaped groove. The groove, however, is proportionately longer. The main difference is in the surface of the egg case, which is rough but not lined as in **G. equi,** there is no different marking on the operculum.

According to the conformation of the egg, it is thus possible to separate the species mentioned above. As **C. fontinella** is close to **G. equi,** it would be reasonable to suppose, then, that in their manner of entrance at least, the larvae of **Cuterebra** resemble those of **Gastrophilus;** and the fact that rodents are continually licking themselves adds strength to the hypothesis.

According to Townsend and Bau the host of **C. fontinella** is **Lepus artemisia,** Bachman (Cottontails). In this part of British Columbia rabbits are not plentiful and we have no records of any having been found parasitized by this grub. It would appear that there is a possibility of **C. fontinella** having another host, two females were collected by Mr. R. S. Sherman on Savary Island, which is a small island in the Straits of Georgia where no rabbits exist. However, mice are quite common on

the islands and on the mainland, this coupled with the fact that an undetermined species has been collected for mice, strengthens the supposition.

An interesting habit of Cuterebrine larvae mentioned by Townsend is their custom of emerging after their host animal has been killed. This apparently takes place only when they are sufficiently mature to pupate. Confirmation of this habit has been obtained from observers in British Columbia. The occurrence has not been observed in **Hypoderma**, and seems peculiar to the parasites under discussion.

Through the kindness of Dr. C. Gordon Hewitt I have obtained Townsend's original description of **C. fontinella**, and find that he gives no description of the ovipositor. The most striking thing about the ovipositor is its shortness, as compared with those of the other Oestridae; and this fact makes one wonder how oviposition is accomplished on, for instance, a small active rodent? One experiment was made with the fly mentioned in the first part of this paper. Immediately after it was captured it was placed in a jar with a white mouse. The mouse became terrified, and whenever the fly buzzed against it, the mouse turned viciously and bit at it. The experiment was, of course, a failure, as both mouse and fly wanted to escape.

### Description of the Ovipositor.

The ovipositor is very short and set in a horse-shoe space, the opening being toward the ventral part of the insect. (Plate 3, Fig. 7). The horse-shoe ring is surrounded by what Townsend describes as the fourth and last segment of the abdomen. He is certainly wrong in this, as there are two distinct segments following the fourth, forming part of the ovipositor, and, in addition to these, the sternite and tergite plates represent suppressed segments. So that there are at least six visible segments in the abdomen. All the segments, including the ovipositor, are densely covered with hairs, a fringe of hair on the margin of the fourth segment partly conceals the ovipositor.

The ovipositor ends in two blunt processes, which correspond to the latero-sternal sclerites, and another, the tergal sclerite, described by Carpenter for **Hypoderma**. (Plate 3, Fig. 6). Ventrally in front of the tergal sclerite, there is a chitinous plate which fits between the latero-sternal sclerites.

In front of the chitinous plate is a paired membranous organ with two points, which are designated in the figures as paired membranous processes. (Plate 3, Figs. 5 and 6).

I am indebted to Mr. Hugh Scott, Curator in Entomology at Cambridge, and Mr. E. E. Austen of the British Museum for the determination of **C. fontinella**; to Mr. G. H. Unwin for collecting literature, and to Dr. F. Torrance, Veterinary Director-General, for permission to publish this article.

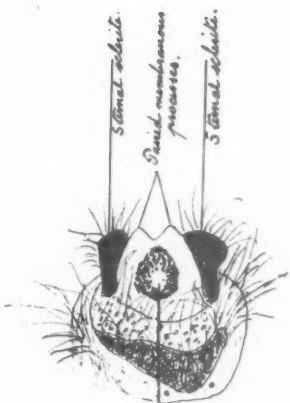



FIG. 5

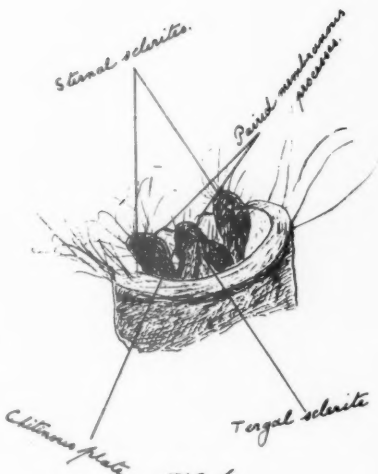



FIG. 6

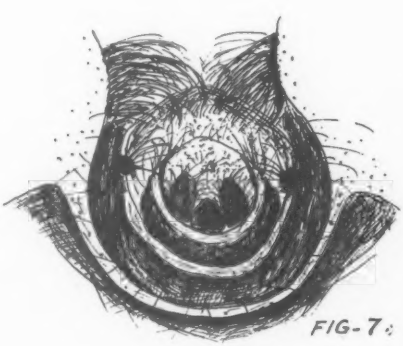


FIG-7.

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### Explanations and Plates 1, 2 and 3.

Photographs and drawings by S. Hadwen.

Fig. 1. Eggs of **C. fontinella,** showing canoe-shape.

Fig. 2. Groove on under side of egg.

Fig. 3. The operculum.

Fig. 4. **Cuterebra fontinella,** Clark.

Fig. 5. Ovipositor, ventral view, showing the sternal sclerites, the paired membranous processes and chitinous plate.

Fig. 6. Dorsal view of ovipositor. Tergal sclerite, sternal sclerites, paired membranous processes and chitinous plate.

Fig. 7. Reproductive organs, general view.

## NOTES ON THE HABITS OF SOME LEPIDOPTERA.

By J. W. Cockle, Kaslo.

Mr. Treherne (Secretary):

Mr. Cockle was unable to come, and he sent me his paper. It is one of the most gratifying things to me, as Secretary of this Society, to receive papers without any special exertion on my part. In getting up the programme for this meeting, a few weeks before I started I had nothing in mind, but on sending out circulars, these papers came rolling in, and we have more than enough for today's meeting. Two papers from the Upper Country have come in without any solicitation, one of them being Mr. Cockle's. I take pleasure in reading it for Mr. Cockle.

The collector is often at a loss to understand why he is unable to find the gender of a species of which the opposite gender is plentiful, and as an instance of this let me instance **Cyanirus nigrescens** Fletcher. The freshly emerged males may be found in great numbers in almost any damp spot along the roads, but there are no females with them. An excursion into the brush upon a sunny hillside will probably result in finding numbers of females of this species which are flying around or resting on the willow or Coeanothus branches, whilst occasionally a poor battered male will be seen flying amongst them. Very rarely a bright, freshly emerged male will be found consorting with them, but such occurrence is unusual. Not until they are faded and worn do the males seem to become attracted by the females.

The same remarks will apply to **Rusticus anna.**

The habit of some of the Argynids are curious. **Argynis monticolor var rhodope** has a peculiar migratory habit. In the early morning it may be found in abundance along the lower valleys, but as the sun comes out and warms the upper mountain slopes it flies upwards. The whole brood seem to take wing in one direction, always upward towards the snow fields and the grassy slopes lately emerged from their snow covering. Here they disport themselves during the heat of the July days. If they ever return to the lower altitudes again I am unable to record, but some must do so or else there would be no brood in the valley the following years. While speaking of the habit of the high mountain species, allow me to dwell for a moment on the curious habit that all high mountain forms have of laying over on their side when resting. One of my favorite hunting grounds is situated in a low pass between the headwaters of two creeks, which are so located that the west wind will blow up both of them, and when the gust of wind strikes the most westerly it rushes up the creek and blows over the summit towards the east. Whilst the wind continues, nearly all the butterflies will come up over the pass and settle with their wings folded sideways in the direction of the wind. Suddenly the wind, of which the main gust has reached the lower valley of the more easterly creek, comes back up the creek and reverses the direction of the breeze at the summit. Instantaneously almost every butterfly is in the air and will settle again under the shelter of the slope on the opposite side. On a breezy day this change may take place every few minutes, with the resulting migration of the butterflies over the summit. This habit of laying over on their side has been noted by many writers, and it becomes habitual with species inhabiting the high mountain slopes. Even when there is no perceptible wind they invariably assume this position, while even the same species when found in the lower valleys will as invariably be noticed in an upright position. Another peculiar thing that may be noticed in both butterflies and moths when flying over a glacier: The temperature of the air for several feet

above the snow is low enough to produce torpidity. The passage of even a light, fleecy cloud over the sun is sufficient to cause them to instantly settle on the snow, where they will remain in a torpid condition until the sun's rays again warm them into activity. I have several times seen the snow literally covered with all kinds of insects which had migrated with the wind and had been caught by the cold of the snow field. In many cases where there has not been a recent rain or snowfall, many of such specimens may be secured in perfect condition. A very curious thing has often occurred to me in reference to **Euvanessa antiopa.** It is well known that this species hibernates and often lives long into the succeeding summer, in fact I have seen one instance where freshly emerged specimens were seen in late August in company with poor, bedraggled hibernated specimens; but the fact that I wish to describe alludes to their habit of remaining in the vicinity of their growing brood of larva. They keep up a short flight along the road for a distance of from three to five hundred feet on either side of the brood, and, when approaching the location of the feeding larvae, will rise and fly round over them several times before proceeding past them in the opposite direction. We all know how animals will protect their young from attack; also we have the case of the English Stickleback and the American Black Bass as two cases where fish are known to protect their young brood, and it has often occurred to me that this peculiarity of **antiopa** might in some way be a like example in the case of insects. Does **antiopa** keep watch over the brood to drive away **Ichmeumonidae** or other insects which might be parasitic on her brood? One fact may also be mentioned, and that is that by far the greater majority of larvae are free from the attack of Ichmeumonidae while they are feeding in colonies than may possibly be found in the case of any other species having the community instinct. The question remains to be solved, why is **antiopa** given the gift of the longest life of any of the North American butterflies, and for what reason does the female remain in the vicinity of her brood during the early stages?

The article by F. H. Wolley Dod in Canadian Entomologist, dealing with the habit of flying over water of **Smerinthus cerisii,** also applies to **S. opthalmicus.** Of the **Saturnidae** I have already published in the annual reports of the Canadian Entomologist Society for 1906 some notes on the spinning methods of **Telea polyphoemus** in the west, showing how they invariably attach their cocoon by a silk thread to a limb instead of allowing it to fall as described by eastern writers. I wish, however, to refer only briefly to the method of **Samia rubra.** The larva of this species usually selects the ridge of a sunny bank facing the south on which to pupate. I am inclined to attach some significance to the height at which the cocoons are attached on the brush as relative to the amount of snow during the following winter, i.e., that when the snow is liable to be deep the cocoon may be spun high up on the brush, whereas

when the snowfall is liable to be shallow over the spot selected for pupation, the cocoons may be spun very near the ground. This must reasonably be considered as only a circumstance and not as an invariable rule.

**Pseudohazis shastaensis** lays its eggs round a small twig in regular rows. These emerge the following spring and pupation takes place in the fall, the imago not emerging until the second year after.

**Diacrisia kasloa.** The males only of this species are attracted by light. I have never taken a female excepting in flight at dusk.

Some of the genus **Shizura** when at rest fold their wings very close to their body with the head downward, the hairs on the thorax standing out straight all round, giving the moth a most peculiar appearance; it is so unlike a moth that it may easily be passed unnoticed. Among the Geometers the genus **Eupithecia** is not largely represented amongst collections. This may be accounted for by the unfamiliarity of collectors with its habits. When at rest, all the **Eupithaciae** spread their wings out flat and attach themselves to the underside of a leaf, or in case where they are attracted by light they will rest on the ceiling overhead; a small, inconspicuous patch on the darkened ceiling is readily passed unnoticed. A good place to find this genus is on a board fence which has cross rails. These afford an excellent resting place for them, more especially if the fence is surrounded by brush. If during the previous night there has been a heavy rain storm, a visit to the fence the following day will often produce a good catch. Beside looking for them on the underside rails of the fence, a sharp blow with a club will often disturb them and cause them to take wing. Many of the **Eustroma, Hydriomena** and allied genus rest during the day under roots, and a particularly favorite place to find them is under the overhanging foliage on a cut bank on the side of a road. Here they rest, away from the glare of the sunlight, cooled by the moist earth. Another favorite place is on the underside of an overhanging rock bluff.

In conclusion, I trust that I have not trespassed too long on the time of the meeting, and that at least some of the members of our Society will find something of interest which will help them in their work amongst the Lepidoptera.

**Mr. Tom Wilson:** Mr. Chairman, I think that the Entomological Society can compliment themselves on having a member who is not only able but does exercise his powers of observation the same as our friend Mr. Cockle has done. When he speaks about the Mountain Forma, I can vouch for him, for I remember once when I was out hunting in the Nicola country, on a sunny morning, there was a flock of insects I had been taking notice of. A few minutes after there was a clap of thunder and they all settled at once and every one of them was lying on its side. They were all in flight when I saw them first, but immediately the thunder came, they settled on their sides.

## NOTES ON THE EARLY STAGES OF EPIRRITA DILUTATA DENIS & SCHIFF.

By G. O. Day, F.E.S., Duncan, B. C.

A female moth was found at rest on tree trunk in the Duncan District of Vancouver Island on 12th October, 1913. It was confined in chip box and laid eggs 13th to 16th October. Eggs laid in irregular masses, some singly, attached to box. In general appearance like minute bunches of light green, oval grapes. Size of egg, .66 by .60 mm. Under hand lens the surface looked pitted all over.

When examined on 14th March, 1914, after wintering outside, the eggs were cayenne-coloured in mass and shiny. Sides a little flattened and indented. The "pitting" still distinct. Under hand lens the colour of individual eggs was a reddish light brown. Began to hatch out March 18th and majority out by the 20th. Larva at first a sooty olive green, no apparent markings; head and first segment rather swoolen; anal claspers fairly spreading. The anal claspers and the segment behind head a lighter green than the rest of the body. Head brown. The larva would eat buds of sallow and the common species of **vaccinium,** but preferred the latter, on which it fed well. All other food offered (including alder, which I had an idea might be its food-plant) was rejected. Larva continued to be of the dull olive colour without marking until 1st April, when those which had newly shed their skins (I am not sure whether for the first or second time), developed a chrome yellow colour with inconspicuous lines running the whole length of the body. At this date these larvae were 5 mm. long. The lines were not very distinct, but I could make out a median dorsal line and two others each side of it on the dorsal area, making five lines altogether. The space between the median line and the first side line, slightly wider than between the second and third. In the next instar, the appearance of the larva much the same, except that the colour becomes a glaucous green, similar to that of the leaves on which the caterpillar feeds, and the longtitudinal lines are rather more distinct, with a decided whitish line just below the spiracles—this line runs along (above) a kind of ridge. The ventral surface has a tendency to whitish, and in the next instar, this whiteness is much more pronounced, becoming a characteristic distinction. The whitish spiracular lines are more marked towards the anus. At this stage (18th April), the larvae were 15 to 17 mm. long. On 29th April they had increased to 25 mm. in length, and some had already commenced to pupate, spinning chambers in the frass collected at the bottom of the breeding jar. The cocoons were fairly strong, for I scraped some masses of frass out before I discovered there were larvae pupating in it. Larvae when full fed, much the same in appearance as already described, only the white

lines have disappeared with the exception of some remains of the spiracular line from the anal clasper to last pair of legs more distinct than ever. Head small, greenish, and there are some white dots on each segment, from which are emitted short single hairs. Belly strikingly greenish white.

All the larvae had disappeared for pupation by 4th May. Fed, healthily, all through, on vaccinium.

Seven moths (all females) emerged about the middle of September. In the natural state the time of appearance here is October.

## THE OYSTER SHELL SCALE.

By Tom Wilson, F.R.H.S.,
Dominion Inspector of Indian Orchards.

In view of the fact that the Oyster Shell Scale (Lepidosaphes ulmi) is one of the most common insects in our orchards, I wish to record for our Proceedings a list of host plants that I have observed in British Columbia infested by this insect. I am perfectly well aware that this insect has been reported on from many sections of Canada and the United States, and that several papers have appeared recording its full life history, habits and destructiveness. The United States Bulletin No. 121 of the Bureau of Entomology, in particular, forms a complete record of this insect, and a long and probably complete list of host plants is mentioned in the text. So far as British Columbia alone is concerned, we have no full record of host plants of our own; consequently to record these, from my own experience, is the main object of this paper. Possibly also I may be able to add a few more host plants to the list in Bulletin 121.

Among the different scale insects which infest our orchards and forests, none has such a large and varied "bill of fare" as the Oyster Shell Scale, and, judging from the different parts of the world in which it is found, few have such a wide geographical range.

We are apt to look on our orchards as the principal place to find the different insect pests, probably because they come closest under our observation; but in many cases our natural forests harbour many of them. Where the original home of the Oyster Shell scale was, it would be difficult or impossible now to determine. It has a world-wide distribution at present, but it is believed that it was first imported into the Eastern United States in the 18th century, from where it has covered the greater part of the North American Continent. It seems to be able to adapt itself to very different climatic conditions, as is evidenced by the fact that it thrives as well here in the neighbourhood of Vancouver as it does on Vancouver Island and in the "dry" country of the

Photo by R. C. Treherne

**Twig showing severe infestation by the Oyster Shell Scale—Lepidosaphes ulmi.**

Okanagan. I have also seen it in all its glory in the Old Country, and, judging from specimens received from Japan, it also thrives in Asia.

Over twenty years ago, when there was a threat made by the Provincial Board of Horticulture to enforce the regulations and compel the people to spray for this scale, I pointed out then that there were several other trees than those growing in our orchards upon which the scale fed and flourished. Since then I have noticed many more, belonging to very different natural orders.

I subjoin a list, beginning with the most common:

**Rosaceae.**

Apple
Pear
Crab apple
Mountain Ash
Roses
**Spirea discolor**
**Prunus emarginata**
English Hawthorn
Douglas Thorn
**Amelanchier alnifolia**
Japanese quince

**Cornaceae.**

**Cornus nuttalii**
**Cornus stolonifera**

**Leguminacae**

Broom
Laburnum

**Salicaceae**

Willows of many kinds
Poplar

and the following:

Vine Maple
Ash
Beech
Elm
Privet
Lilac
Box
**Rhamnus purchiana**

We notice from this that we have several different orders represented, and I doubt not that there are many others that have not come to my attention. I have found the insect at sea level up to an altitude of not less than 3,000 feet.

Happily for us here the scale is extremely subject to parasitism and reproduces slowly, else with our beneficent climate it would be difficult to keep in check.

Little more need be said. I should be pleased to hear from anyone who has recorded this scale on any other host plant than I have mentioned. The life history is simple and single brooded and outlined for the Society in an article in our last annual Proceedings* by Mr. Treherne.

* Bulletin No. 4, N. S., 1914, B. C. Ent. Soc.

## PAPERS FOR FUTURE PUBLICATION.

The following papers, presented at the meetings, have been withdrawn for publication at some later date:

1. Insect Pests in the Okanagan ..... Max Ruhman
2. Control of Incipient Infestation of Codling Moth in a New District ..... W. H. Lyne
3. New Sprays of Up-to-date Interest ..... L. L. Palmer
4. The Tarnished Plant Bug ..... R. C. Treherne
5. The Part Played by Insects in the Spread of Plant Diseases ..... J. W. Eastham
6. Insect Pollination of Plants ..... Tom Wilson
7. Conditions Relative to the Codling Moth in British Columbia ..... Thomas Cunningham
8. Insects of the Lower Fraser Valley, 1914 ..... F. H. Getchell
9. Insects of the Greenhouse ..... G. E. Wilkerson
10. Ornamental and Shade Tree Insects ..... R. C. Treherne
11. Life History of the Codling Moth on the Pacific Coast of B. C. ..... W. H. Lyne
12. Forest Insect Notes ..... J. M. Swaine
13. Records from Atlin ..... E. M. Anderson
14. Notes on the Geometridae of V. I. ..... E. H. Blackmore
15. Lithocolletis gaultheniella ..... R. N. Chrystal

Lady Bug gave a party,
It was a grand affair;
The finest Beetle dandies
And the nattiest Gnats were there.
The Glowworm glowed his brightest,
And the Hornet played his horn;
The Butterfly brought butter,
And the Miller Moth brought corn;
The Caterpillar sat and purred,
The Horse Fly galloped high,
The Ants came with their uncles
And the Spiders came with pie;
The June Bug in his buggy came
Dragged by the Dragon Fly;
The Centipede gave his last cent
To see the pair go by.
It was a splendid party,
But when the last was done
The Hop Toad sat outside the door
And swallowed every one.

—ANON.